Situated Cognition Theory:

An Analysis of the Literature and Implications

For Learning Environments

Geoffrey Boyle

EDIT 704, Section 1
Professor Schoonmaker
April 16, 2008

Abstract

The last few decades have seen multiple reevaluations of our understanding of this fundamental process we call learning. Situated cognition theory lies at the crossroads of multiple disciplines. In this paper, the influence of the social sciences on an understanding of learning is reviewed as well as the implications for two contemporary learning environments: public schools and the DaimlerChrysler Corporation.

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Situated Cognition Theory is less than three decades old, but it appears to model the way humans have been learning for as long as we have been social beings. This theory does this by asking what it is that knowledge does for us, and then looking at when that knowledge does what it does for us. Brown, Collins, and Duagid (1989) captures the crux of situated cognition by the "folk categories of 'know what' and know how" (p. 32). Knowing what describes factual recall, conceptual relationships, and even theories of practice, but it does not make anything happen. Conversely, knowing how is the demonstration of knowledge. Demonstration is the production of something useful to people. Brown et al (1989) make the argument that many theories of learning have created a schism between knowing what and knowing how (p. 33). By subscribing to these theories, classrooms currently focus on knowing what and largely ignore knowing how. I would propose that the implications of this are clear: situated cognition calls for a paradigm shift in the way schools teach and, more importantly, the measures used to determine when learning has taken place.

What Disciplines Support The Theory of Situated Cognition?

Both Anthropology and sociocultural studies have generated insights that support situated cognition as a viable theory of learning. James Whitson and David Kirschner state that the "*anthropological and sociocultural traditions that inform situated cognition theorizing are predisposed to take this same commonsense notion of situation as fundamental to inquiry*" (1998, p. 25). If we examine once more Brown et al's phrase "know how" in the context of

Kirschner et al's statement, we understand Kirschner to be saying that the setting is integral to the process of inquiry, i.e. the production of knowledge. Anthropology has provided us with examples of how small scale societies pass knowledge, or know how, along from generation to generation as the result of inquiry in situ. The societies that have traditionally been under the anthropological lens were "intact indigenous groups interacting in bounded spatial/temporal location" (Kirschner, 1998, p. 25). In other words, they were small groups of people producing goods at a subsistence level for themselves as they had been for some generations, out of contact with modern methods of production. The necessity to produce was the driving force behind any type of inquiry that took place and there was an absence of education removed from production. Knowledge and production were one.

Sociocultural theory, another theory supporting situated cognition, "focused on the zone of proximal development, again informed by the intersubjective accommodations within a fixed "spatiotemporal context" (Kirschner, 1998, p. 25). The term intersubjective refers to the communication between individuals who experience the world from slightly different perspectives, and accommodations refers to the adaptations and re-understandings that take place while these individuals participate together as an ongoing group in order to accomplish the tasks of everyday life. Vygotsky (1978) describes the zone of proximal development as the conceptual space in which a child learns by simply observing older children or adults practicing a skill. This is in contrast with learning by direct instruction which is generally supported by contemporary educational methods (p. 79). Essentially, what both anthropology and sociocultural theory tell us is that more advanced learners help less advanced learners move up to the next level of skill. The critical distinction is that most people, most of the time, have learned in order to immediately apply knowledge to produce tangibles.

Another way of looking at the common element that situated cognition theory derives from anthropology and sociocultural theory is that knowledge is understood to be something that "takes place within the world and not in minds somehow separate from or outside the world" (Whitson, 1997 p. 98). Catherine Hansman (2002) reiterates Whitson's comment thusly: "Lave and other proponents of situated cognition argue that knowledge and learning are intertwined with the context in which they occur" (p. 142). We can infer from there are proponents of situated cognition who would argue that learning practices might be well served to adopt pre-modern or perhaps pre-industrial notions of what learning is and the entailed teaching methodologies. Learning is not a product created by schools, but rather a process that must involve production of genuine cultural artifacts, whether these are food and clothing, or computer programs and rebuilt automotive engines. An example of a pre-industrial teaching methodology is the apprentice/journeyman/master learning paradigm. It has been researched by Lave and we will investigate this later when we discuss Etienne Wenger's community of practice.

Does This Apply to Conceptual Work As Well As Physical Work?

Let us examine a comment of Brown et al's (2002): "Learning how to use a tool involves far more than can be accounted for in any set of explicit rule" (p. 32). This is to say that the use of a tool involves not only movements of muscles and bones that cannot adequately be recorded in a way that can by codified and taught in a classroom, but how the environment reacts to that tool. In other words, the tool must be used by the user in the actual setting of production, e.g. the field or the shop, for a complete understanding of its usage to develop in the learner. Similarly, Brown argues that "c*onceptual tools similarly reflect the cumulative wisdom of the culture in*

which they are used and the insights and experience of individuals" (Brown et al). Brown is leading us to the conclusion that what is true about producing the basic necessities of life with hand tools is also true of the tools used in the advanced fields of thought cultivated by complex societies, e.g. mathematics can be formalized and removed to a classroom, or utilized in a factory to build a better product.

Eric Bredo (1994) compares situated cognition with competing theories of learning by saying: "The symbol-processing approach begins with theory and works towards practice, while the situated approach begins with practice and works towards theory" (para. 5). He compares the symbol processing approach to that of a computer that is non-comprehendingly doing formal operations using symbols but without understanding what the symbols represent. He argues that comparisons of human learning to computer processing have led to a perception that human-made computers were models of how the human mind works. The situated cognition approach, Bredo (1994) argues, "arose to counter the misuse of symbol-processing theory" (para 6).

What Comes First: Knowing or Doing?

If we go back to what Brown et al (1989) wrote, we can see quite neatly the premise upon which situated cognition theory is based:

> "A theory of situated cognition suggests that activity and perception are importantly and epistemologically prior --- at a nonconceptual level --- to conceptualization and that it is on them that more attention needs to be focused. An epistemology that begins with activity and perception, which are first and foremost embedded in the world, may simply bypass the classical problem of reference --- of mediating conceptual representations." (p. 35)

The epistemology underlying situated cognition is that learning entails the process of doing. In the band level societies studied by anthropologists, people do not first learn all of the steps to shooting an arrow or starting a fire before touching bow and arrow or flint and tinder. They start with the tools in hand and then proceed to learn to use them.

Brown et al (1989) refers to the problem of "reference --- of mediating conceptual representations", which is to say, the problem of communication when the referent is not present . Concepts are "embedded in the world" and trying to take the concepts out of practice, mediating them with representations rather than reality, results in a new form of learning in a new context (p. 35). In other words, the youngster learning to make fire who has been removed from the outdoors and placed in a classroom of sorts is now learning not how to make fire, but how to learn how to symbolically represent the making of fire. He is learning the story of making a fire, but not necessarily gaining applicable knowledge. So, after he learns how to learn how to make fire, he can set about learning how to make a fire. Disappointingly for the young lad, everyone else has already made their fire.

What Situated Cognition Looks Like:

Communities of Practice

Etienne Wenger (2008) develops the ideas outlined by situated cognition into what he calls communities of practice. He describes it "In a nutshell: Communities of practice are groups of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly" (para 1). These communities can include a group of students in school, a group of mechanics who own neighboring repair shops, or a band of hunter/gatherers. The characteristics that are critical to defining a community of practice are domain, community, and

practice. The domain is what the community regularly communicates about. The community is not only the people, but the activities engaged in which give rise to the ongoing body of communication regarding their domain. Finally, the practice includes what each member does that contributes to the domain via the community activity. The practice is what gives them knowledge to communicate, what makes it a community of practice. It should be noted that communities of practice do not always recognize themselves as such. They can have a wide range of formality as long as they adhere to the three characteristics mentioned above (Wenger, 2008, para 6).

The term 'community of practice' was coined by Etienne Wenger while studying with the aforementioned anthropologist, Jean Lave. Their "studies of apprenticeship reveal[ed] a more complex set of social relationships through which learning [took] place mostly with journeymen and more advanced apprentices" (Wenger, 2008, para 9). What this reveals has two-fold implications for learning theory. The first is that learning can take place among people who are closer to being peers than master and apprentice (read teacher and student). This is in contrast to the traditional model where knowledge moves only in one direction, which brings us to the second implication. The second is that the relationships are more complex than that of a traditional learning setting, where each student has a hierarchical relationship with the teacher, but not with each other. In Lave and Wenger's research, they uncover a web of relationships between apprentices and journeyman. Vygotsky's zone of proximal development comes to the fore, illuminating for us how direct instruction as seen in the classroom can be effectively supplanted by teams of workers of varying skill, i.e. apprentice and journeyman. As they work alongside one another in a community of practice, learning takes place as work is done and products are produced. In this way, refinements of practice can take place over weeks and years

and generations, refinements of use and practice of technique and tool passed on from user to user.

Considering Situated Cognition:

Implications for Instruction

Situated cognition theory provides significant insight into what types of changes might make instructional environments more successful. Darlene Russ-Eft (2004) references guidelines offered by several prominent situated cognition theorists:

1. Training should provide settings for group problem solving so that trainees can express their mental models to each other, improve their mental model, and use alternative mental models. (Sonntag, 1996, p. 345)
2. Training needs to take place within rich contexts or situations (involving real life tasks or using media to simulate such situations) Russ-Eft (2004).
3. Training should be "authentic," using realistic situations, leading to trainee's acquisition of the requisite knowledge and the condition for applying that knowledge (Sonntag, 1997).
4. Trainees should be supported by "coaching" or "scaffolding" and should "fade" over time (Russ-Eft, 2004).

In light of these guidelines, we will examine two environments where situated cognition theory might have a significant impact. The first is public schools, especially high school. Let us assume that the high school classroom is an environment that students want to escape from, never to return. Let us assume that they believe they will never be able to use what they are

learning later. If this is the case, and we apply this belief to what situated cognition tells us, we might conclude that they are not entirely wrong in wishing to escape this learning death zone. We can then conclude that anything learned there will not be used again once the students have left the classroom. Resnick (2007), writing in the American Educational Research Association bulletin, comments that the current texts used in classrooms are "an attempt to meet wide-ranging science standards, cover a daunting array of topics and offer students an extremely incoherent and, at times, almost incomprehensible array of facts" (p. 2). While these textbooks offer a great deal of symbolic information, it is too often mostly or entirely removed from the context in which the knowledge would be useful. So an analysis of classrooms where textbooks are used to teach might reveal a paradigm where guidelines one, two, and three do not fit, although it would be possible to find guideline four in classrooms where teachers integrate group work activities.

Barbara Rogoff (2001) proposes schools where "learning activities are planned by children as well as adults, and where parents and teachers not only foster children's learning but also learn from their own involvement with children' (p 3). There are certainly some communities of practice in every school, but they rarely do they cross the division lines between students, teachers, and parents. Lave (1996) pushes the theory to more of an extreme, that to "add situated contexts to learning experiences" is still artificial, does not create a genuine learning environment, and that "a more promising alternative lies in treating relations among people, tools, activity as they are given in social practice" (p. 7). Lave's findings on the apprentice-journeyman relationships seem to preclude the learning activities proposed by Rogoff, unless they actually move outside the school into the context in which the knowledge

would be used. The next example of situated cognition in context pushes learning methods much closer towards a model described by Lave.

The DaimlerChrysler Corporation is our second focus, and here, communities of practice have had a significant impact on learning in that environment. In fact, all four of the guidelines above are demonstrated in this environment. Etienne Wenger et al (2002) reports on the effects of these communities in Cultivating Communities of Practice. Just as Brown, Collins, and Duagid were publishing their work on situated learning, the then named Chrysler corporation was noticing an organic development of such entities. Wenger (2002) writes that these entities arose out of the need for communication of practice across institutionalized gaps. Chrysler had undergone a radical organizational shift and although the objectives of the organizational shift had been met, there were some unintended consequences as well. The shift was from a linear design process very similar to an assembly line to one where teams of engineers created cars from start to finish. So while workgroups centered on car platforms could achieve a higher turnaround on their designs, there arose inconsistencies in the way parts such as brakes were being designed for different platforms. There was no purpose to the design differences, and they only complicated manufacturing, but there was no way built into the new organizational structure to avoid such complications. So, engineers who knew each other from before the organizational shift began to meet informally to discuss these issues. Management noticed the positive effects of these meetings but did not institutionalize them because they wanted to maintain the primary allegiance of engineers to the platforms, not the informal communities that had arisen. They were named Tech Clubs and became an integral part of the engineering wing of Chrysler (pp 1-4). Wenger (2002) writes that “through the Tech Clubs, Chrysler realized the value of what today people call “communities of practice” (p.3).

The Tech Clubs show aspects of all four of Russ-Eft's guidelines. The first guideline calls for group problem solving. This was certainly accomplished as the members of the Tech Clubs came together to share problems and solutions. The fact that this was all taking place in a work environment and not a training environment provided all of the richness called for by guideline two. The Tech Clubs domain was centered on specific car parts such as brakes, and these brakes would be used in the many contexts of different car platforms, yet they all performed the same function. By associating with other brake engineers from other car platforms, they gained a greater range of insight into the brake domain in diverse contexts. It is notable that although the guidelines refer to the learners as trainees, and the members of Chrysler's communities of practice were all engineers, the two are equivalent as all professionals continue to learn throughout their careers, either formally or informally. Guideline three calls for authenticity in training. Since these engineers were all producing products for the end users, there is not level to more to that could make their Tech Club training any more authentic. The demonstration of 'know how' was being applied here. The fourth guideline would be seen as well, but because the engineering responsibilities of the platform teams was to design and build new cars cyclically and to keep up with changing technologies, the fade experienced would occur cyclically as well. Also, more experienced engineers would take on the role of journeyman to the apprentice of less experienced engineers, recalling the learning relationships of Lave's research.

In summary, an analysis of situated cognition and contemporary learning environments results in a two-part implication. The first is to reduce or eliminate the need for bridging the gap between symbolozied knowledge and knowledge in its authentic context. In other words, this theory illuminates the contrast between 'know what' and 'know how', or theory versus practice.

It highlights the problems generated when knowledge as symbol becomes the dominant paradigm instead of knowledge as production. The second part is a unification of the training and production environments, both for children learners and adult learners.

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